EXECUTIVE SUMMARY

Long Term Monitoring of Broken and Seated Pavements

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This report presents details of a study conducted by the University of Cincinnati (UC), in association with the Ohio Department of Transportation (ODOT), to evaluate the long term performance of asphalt overlays on broken and seated (B/S) concrete pavements, using field experiments. The primary purpose of this study is to evaluate the effectiveness of breaking and seating as a rehabilitation strategy for retarding reflective cracking in asphalt concrete (AC) overlays on jointed reinforced concrete pavements (JRCP). Several test sections were constructed by milling the original AC layer, breaking and seating the concrete slabs and constructing new AC overlays. Control sections were constructed adjacent to the B/S sections in the same way, but without breaking the underlying concrete slabs.

Two types of pavement breakers were used in this study, namely guillotine and pile hammer. The majority of the concrete slabs were broken into 0.46 m (18") segments. The extent of breaking was closely monitored. The performance of the test sections was monitored for a total period of nine years. The monitoring data included deflection measurements, crack mapping, pavement condition surveys (PCR) and roughness surveys on the original pavement and on the overlay. The results indicate that the B/S treatment has a significant effect on the structural response and behavior of the resulting pavement. Breaking the concrete slabs into smaller pieces resulted in a reduction in the flexural strength, an increase in the surface deflection (50% to 100%), and a decrease in AREA and Spreadability (20 to 30%). The Edward Ratio has been consistently high on B/S pavements (up to 30%) indicating a structural behavior closer to flexible pavements.

The reflection cracks on all the control sections appeared within two years after the AC overlay and within four years, more than 80% of the joints in all the control sections showed reflection cracks. The B/S sections were relatively free of cracks after nine years. In particular, the test sections where a pile hammer was used had less than 17% joint reflection cracks, while the control sections in the vicinity had 80% to 100% joint reflection cracks. This result clearly indicates that breaking and seating has been extremely effective in delaying and minimizing reflection cracking.

The primary difference in cost of control and B/S sections could be in the type, extent and timing of major rehabilitation. The mitigation of reflection cracking will cause the pavement PCR and serviceability to remain higher for a longer period of time than if the reflection cracks were allowed to come through. The lack of reflection cracking translates into a delay in future maintenance and rehabilitation which will more than make up or the extra cost of breaking the pavement. The difference in the cost will ofcourse depend on the type, extent and timing of major rehabilitation.

Based on the results of this study it is concluded that breaking and Seating is an effective technique for the rehabilitation of composite pavements (AC over JRCP) and it provides a cost-effective solution for the maintenance and rehabilitation of in-service composite pavements.